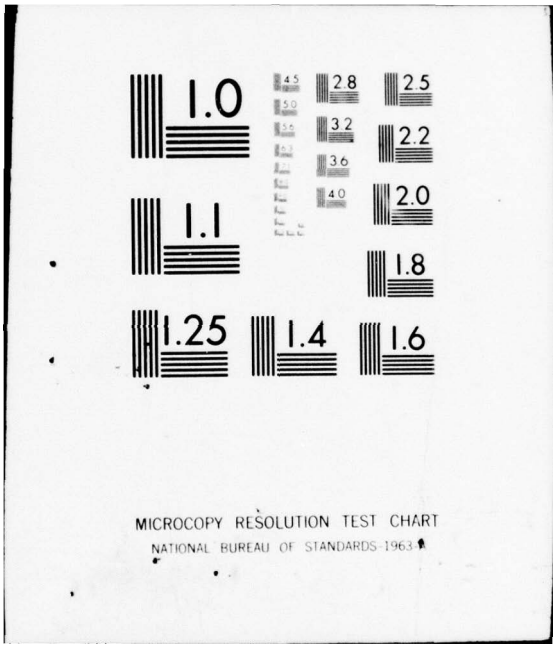
AD-A048 444 RESEARCH TRIANGLE INST RESEARCH TRIANGLE PARK N C APP--ETC F/G 6/5
USE OF ALGORITHMS FOR DEVELOPING A HANDBOOK TO AID INDIVIDUALS --ETC(U)
DEC 77 E ROBERTSON, G D OFIESH, D R JOHNSTON DCPA01-74-C-0285

UNCLASSIFIED RTI-44U-1000 NL

1 OF 1
ADA048444

END
DATE FILMED
2-78
DDC


1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0
4.5
5.0
5.6
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

AD A048444

December 1977
DCPA Work Unit 2431G
Contract No. DCPA 01-74-C-0285

12
P. S.

FINAL REPORT 44U-1000

USE OF ALGORITHMS FOR DEVELOPING A HANDBOOK TO AID INDIVIDUALS IN COPING WITH MEDICAL PROBLEMS IN A NUCLEAR ATTACK EMERGENCY

Approved for Public Release; Distribution Unlimited

DDC FILE COPY

RESEARCH TRIANGLE INSTITUTE
Post Office Box 12194
Research Triangle Park, N.C. 27709

DDC
RECEIVED
JAN 4 1978
B

RESEARCH TRIANGLE INSTITUTE
OPERATIONS ANALYSIS DIVISION
APPLIED ECOLOGY DEPARTMENT
RESEARCH TRIANGLE PARK, NORTH CAROLINA 27709

DCPA Review Notice

This report has been reviewed in the Defense Civil Preparedness Agency and approved for publication. Approval does not signify that the contents necessarily reflect the views and policies of the Defense Civil Preparedness Agency.

DETACHABLE SUMMARY

FINAL REPORT 44U-1000

December 1977

Use of Algorithms for Developing a Handbook to Aid Individuals in Coping with Medical Problems in a Nuclear Attack Emergency

by

Elizabeth Robertson and Gabriel D. Ofiesh
Ofiesh Associates, Inc.

and

Donald R. Johnston

for

DEFENSE CIVIL PREPAREDNESS AGENCY

Washington, D. C. 20301

DDC
RECEIVED
JAN 4 1978
B

under

Contract No. DCPA 01-74-C-0285
DCPA Work Unit 2431G

Approved for Public Release; Distribution Unlimited

SUMMARY

This study was directed toward the development of guidance for crisis relocation planners in preparing a handbook to aid individuals in coping with a nuclear attack emergency, of a prototype handbook that would enable the planner to prepare a document specifically tailored to his/her particular jurisdiction and environment, and of detailed checklists for the several phases of crisis relocation. While the research objectives could not be fully realized due to limitations of time and funds, significant progress was made towards accomplishing them. The progress made to date is reported in two separate documents. One document containing the guidance materials, the prototype handbook, and the checklist will not be published at this time, pending further developmental work.

This document consists of four sections. The first section provides an introduction to the report and sets forth the background and objectives of the research. In the second section, research leading to the development of a prototype handbook is described. The third and fourth sections present conclusions and recommendations, respectively.

A prototype handbook to aid individuals in coping with medical problems during a nuclear attack emergency was developed. The prototype handbook contains algorithms for treating 51 medical conditions selected from the Medical Self-Help course manual and other recognized sources. A center-located index and a tab system for locating algorithms are distinctive features of the prototype. Additional information contained in the handbook includes instructions on bandaging, dosages of over-the-counter medications, and an algorithm for life-threatening conditions.

As a part of this research effort, sample algorithms were field tested in Washington, D.C., in Colorado (at both the state and the local level), and in Tucson, Arizona. The prototype handbook was field tested with a group of 60 subjects of Portsmouth, Virginia.

On the basis of the field test results, it was concluded that with further development the prototype handbook using algorithms would effectively aid individuals in coping with medical problems in the absence of trained medical help.

White Section ☒
Buff Section ☐
JUSTIFICATION
BY
DISTRIBUTION/AVAILABILITY CODES
Dist. AVAIL. and/or SPECIAL
A

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE	READ INSTRUCTIONS BEFORE COMPLETING FORM
1. [redacted] RTI-44U-1000	2. GOVT ACCESSION NO. / 3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle): USE OF ALGORITHMS FOR DEVELOPING A HANDBOOK TO AID INDIVIDUALS IN COPING WITH MEDICAL PROBLEMS IN A NUCLEAR ATTACK EMERGENCY,	5. TYPE OF REPORT & PERIOD COVERED: FINAL REPORT,
	6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s): Elizabeth Robertson, [redacted] Gabriel D. Ofiesh, Donald R. Johnston	8. CONTRACT OR GRANT NUMBER(s): DCPA 01-74-C-0285
9. PERFORMING ORGANIZATION NAME AND ADDRESS: Research Triangle Institute, Post Office Box 12194, Research Triangle Park, N. C. 27709	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS: DCPA Work Unit 2431G
11. CONTROLLING OFFICE NAME AND ADDRESS: Defense Civil Preparedness Agency, Washington, D.C. 20301	12. REPORT DATE: Dec[redacted]77
	13. NUMBER OF PAGES: 50 (12) 53p.
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)	15. SECURITY CLASS. (of this report): UNCLASSIFIED
	15a. DECLASSIFICATION/DOWNGRADING SCHEDULE: N/A

16. DISTRIBUTION STATEMENT (of this Report)

Approved for Public Release; Distribution Unlimited

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Algorithms
Medical problems
Crisis relocation
Prototype handbook
Lay person
Treatment

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report describes progress made in the development of guidance for crisis relocation planners in preparing a handbook to aid individuals in coping with the health, medical, and safety aspects of a nuclear attack emergency. The desired handbook should provide directions for the untrained person dealing with medical problems when no trained medical help is available and should do so without prior formal instruction. A prototype handbook meeting those requirements

next page

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

409702 B

Block Number 20 (Cont'd)

was developed. The prototype handbook employs algorithms to present information on the treatment of 51 conditions. Treatment information was derived primarily from the Medical Self-Help course manual. In addition, the prototype handbook contains instructions on bandaging, dosages of over-the-counter medications, and an algorithm for life-threatening conditions. The prototype handbook was field tested on a group of 60 subjects. The principal conclusion of this research is that algorithms are highly effective in this application. Specific recommendations for increasing handbook effectiveness are made.

RESEARCH TRIANGLE INSTITUTE
OPERATIONS ANALYSIS DIVISION
APPLIED ECOLOGY DEPARTMENT
RESEARCH TRIANGLE PARK, NORTH CAROLINA 27709

DCPA Review Notice

This report has been reviewed in the Defense Civil Preparedness Agency and approved for publication. Approval does not signify that the contents necessarily reflect the views and policies of the Defense Civil Preparedness Agency.

FINAL REPORT 44U-1000

December 1977

Use of Algorithms for Developing a Handbook to Aid Individuals in Coping with Medical Problems in a Nuclear Attack Emergency

by

Elizabeth Robertson and Gabriel D. Ofiesh
Ofiesh Associates, Inc.

and

Donald R. Johnston

for

DEFENSE CIVIL PREPAREDNESS AGENCY

Washington, D. C. 20301

under

Contract No. DCPA 01-74-C-0285
DCPA Work Unit 2431G

Approved for Public Release; Distribution Unlimited

PREFACE

This report was prepared by the Research Triangle Institute (RTI) and Ofiesh Associates (Subcontractor to RTI) as a part of a research program being conducted by the Defense Civil Preparedness Agency (DCPA) to evaluate crisis relocation as a strategy for protecting populations threatened by large-scale disasters. Prepared under Contract No. DCPA 01-74-C-0285, Management of Medical Problems Resulting from Population Relocation, the research objectives were:

1. To develop guidance for crisis relocation planners in preparing a handbook to aid individuals in coping with a nuclear attack emergency. The effort specifically addressed the health, medical, and safety aspects of population relocation. The research also addressed the following phases of a nuclear emergency: preattack, attack, and immediate postattack, leading into recovery.
2. To develop a prototype handbook that would enable the civil preparedness planner to prepare a document specifically tailored to his particular jurisdiction and environment.
3. To prepare detailed checklists for the following phases of relocation or its equivalent for shelter living:
   - Preparation for relocation
   - Relocation
   - Survival during relocation
   - Return

While the research objectives could not be fully realized due to limitations of time and funds, significant progress was made toward accomplishing them. This document reports the progress made to date. The guidance materials, prototype handbook, and checklists are contained in a separate report which will not be published at this time, pending further developmental work.

This report consists of four sections. The first section provides an introduction to the report and sets forth the background and objectives of the research. In the second section, research leading to the development of a prototype handbook is described. The third and fourth sections present conclusions and recommendations, respectively.

ACKNOWLEDGEMENTS

The authors wish to acknowledge the continuing guidance and support provided by Dr. Dean E. Ewing, the Contracting Officer's Technical Representative. In addition, the assistance and advice of Messrs. James W. Kerr and Stephen Birmingham, Staff Director and Research Systems Analyst, respectively, of the Emergency Operations Systems Division, Research Directorate, DCPA, are greatly appreciated.

We are also appreciative of the efforts and advice of the following individuals in the development of a prototype handbook:

- Richard Casanova - Tucson-Pima County Emergency Services, Tucson, Arizona
- John Cunningham - Colorado Division of Disaster Emergency Services, Denver, Colorado
- Mrs. Marion Diamond, Los Angeles County Emergency Medical System, Los Angeles, California
- Frank J. Hubka - Colorado Division of Disaster Emergency Services, Denver, Colorado
- Dr. Carl Jelenko, III - Department of Surgery, Medical College of Georgia, Augusta, Georgia
- Jerald Martin - Defense Civil Preparedness Agency, Region Six, Denver, Colorado
- Frank J. Mollner - Defense Civil Preparedness Agency, Region Six, Denver, Colorado
- Carl Pawlass, Jr. - Defense Civil Preparedness Agency, Region Six, Denver, Colorado
- Dr. Karl R. Reinhard - Indian Health Service, United States Public Health Service, Tucson, Arizona
- Dr. Frank Stritter - Division of Medical Education, University of North Carolina School of Medicine, Chapel Hill, North Carolina
- Ron Zimmerman - Tucson-Pima County Emergency Services, Tucson, Arizona

Finally, the authors are pleased to acknowledge the generous assistance of J. Herbert Simpson, Executive Secretary, U.S. Civil Defense Council, and the staff of the Portsmouth, Virginia Emergency Operating Center who arranged for a large-scale test of algorithms developed for inclusion in a prototype handbook.

ABSTRACT

This report describes progress made in the development of guidance for crisis relocation planners in preparing a handbook to aid individuals in coping with the health, medical, and safety aspects of a nuclear attack emergency. The desired handbook should provide directions for the untrained person dealing with medical problems when no trained medical help is available and should do so without prior formal instruction. A prototype handbook meeting those requirements was developed. The prototype handbook employs algorithms to present information on the treatment of 51 conditions. Treatment information was derived primarily from the Medical Self-Help course manual. In addition, the prototype handbook contains instructions on bandaging, dosages of over-the-counter medications, and an algorithm for life-threatening conditions. The prototype handbook was field tested on a group of 60 subjects. The principal conclusion of this research is that algorithms are highly effective in this application. Specific recommendations for increasing handbook effectiveness are made.

TABLE OF CONTENTS

	Page Number
PREFACE	ii
ACKNOWLEDGEMENTS	iii
ABSTRACT	v
LIST OF FIGURES	vii
LIST OF TABLES	vii
I. INTRODUCTION	1
A. Research Objectives	1
B. Assumptions	2
II. PROTOTYPE HANDBOOK DEVELOPMENT	3
A. Data Sources	3
B. Handbook Format Determination	4
C. Condition Algorithms	6
1. Conditions	6
2. Design of Algorithms	6
3. Semantics	7
4. Prototype Handbook	7
D. Life-Threatening Conditions	16
1. Radiation Exposure Guide	16
2. Calculation	18
III. CONCLUSIONS	19
IV. RECOMMENDATIONS	22
APPENDIX A: FIELD TEST RESULTS	A-1
APPENDIX B: TEST SUBJECTS COMMENTS ON PROTOTYPE HANDBOOK	B-1

LIST OF FIGURES

Figure		Page Number
1	Front Cover of Handbook Showing Introductory Algorithm	10
2	Part of the Center-Located Index	11
3	Tab Numbering in Prototype Handbook.	12
4	Condition Algorithm for Heat Emergencies . . .	13
5	Condition Algorithm for Bleeding	14
6	Sample Case Used in Test of Prototype Handbook	15
7	Life-Threatening Condition Algorithm	17

LIST OF TABLES

Table		Page Number
I	Conditions Selected for Inclusion in Prototype Handbook	9

I. INTRODUCTION

The Defense Civil Preparedness Agency (DCPA) is engaged in a comprehensive research program to evaluate the adequacy of crisis relocation as a strategy for protecting populations threatened by major hazards. This report describes the results of a research project concerned with one aspect of the management of medical problems resulting from population relocation. The research described herein is concerned with the feasibility of providing the individual citizen with a manual or handbook that would aid him or her in dealing with health problems in circumstances when no professional medical care is available (e.g., during relocation or in-shelter).

With the discontinuation of the Medical Self-Help (MSH) program sponsored by the Defense Civil Preparedness Agency, a highly effective effort to prepare citizens to cope with medical problems died. In view of that development, consideration was given to other means of disseminating health, medical, and safety information that would be useful to persons caught in emergency situations where no trained medical care was available. It was apparent, also, that the selected means of dissemination must assist the user without benefit from any prior formal instruction. This report is concerned with preliminary work to develop a prototype handbook that met the above requirements.

A. Research Objectives

The objectives of the research described herein were:

1. To develop guidance for crisis relocation planners in preparing a handbook to aid individuals in coping with a nuclear attack emergency. The effort specifically addressed the health, medical, and safety aspects of population relocation. The research also addressed the following phases of a nuclear emergency: preattack, attack, and immediate postattack, leading into recovery.
2. To develop a prototype handbook that would enable the civil preparedness planner to prepare a document specifically tailored to his particular jurisdiction and environment.
3. To prepare detailed checklists for the following phases of relocation or its equivalent for shelter living:

- Preparation for relocation
- Relocation
- Survival during relocation
- Return

B. Assumptions

A general assumption made was that the guidance, handbook, and checklists developed in this project must address both the shelter-in-place and the crisis relocation options. After considering various combinations of events, resources, circumstances, etc., it was determined that if the materials developed were suitable for a worst-case situation, then they would also be appropriate for less austere situations. Thus, the specific worst-case assumptions employed in this research were:

- A nuclear attack occurs.
- The population is in shelter.
- No ready access to medical care is available.
- No two-way communications are available.
- A radio receiver is available.
- A 2-week in-shelter period is necessary.
- Minimal medical supplies are available.
- Shelterees have a fourth grade educational level, i.e., they can read a newspaper.

The approach followed in this research consisted of the following steps: selection of data sources, determination of handbook format, development of condition algorithms, and testing of the algorithms.

Section II of the report describes preliminary work on the development of a prototype handbook, including the selection of data sources, the preparation of condition algorithms, and the development of an algorithm for life-threatening conditions. Section III presents conclusions reached in the course of this research, and Section IV presents recommendations for improving the prototype handbook.

II. PROTOTYPE HANDBOOK DEVELOPMENT

This section contains subsections dealing with medical data sources, format determination, disease/condition algorithms, and the algorithm for life-threatening conditions.

A. Data Sources

Following lengthy discussions among the project staff and consultation with the Contracting Officer's Technical Representative, it was determined that this effort should be restricted to the medical problems covered by MSH and that the MSH manual would serve as the primary data base, supplemented, as appropriate, by other recognized sources. The advantage of using the MSH manual as the data base is obvious; it is a body of information that has already been approved by the cognizant bodies and authorities. Also, a detailed analysis of the "phases of nuclear emergency" and "phases of relocation or its equivalent for shelter living" showed that the conditions most likely to be encountered were common to both phases; thus, each phase did not need to be addressed separately.

Further, restricting coverage to the conditions covered by MSH would result in a simpler, less voluminous, more easily understood document, thus enhancing the effectiveness of the end-product. In addition, this approach would eliminate numerous decision points for the user, allowing quick assimilation of the material while minimizing error.

The data base finally selected consisted of the following documents:

- Family Guide - Emergency Health Care, A Reference Guide for Students of the Medical Self-Help Training Course. Washington, D.C.: U.S. Government Printing Office, 1966.
- Austere Medical Care for Disaster - Reference Manual for Allied Health Workers and Selected Trained Laymen. Washington, D.C.: U.S. Government Printing Office, 1964.
- Family Guide - Emergency Health Care. Washington, D.C.: U.S. Government Printing Office, 1962.
- D. N. Holvey (ed.), The Merck Manual of Diagnosis and Therapy, 12th ed. Rahway, N.J.: Merck Sharp and Dohme Research Laboratories, 1972.
- Army Field Manual - First Aid for Soldiers, HQ, Department of the Army, June 1976.

Also, because of their relevance to the present effort, Volumes I*, II*, and III** of "Management of Medical Problems Resulting from Population Relocation," were consulted regarding the differing environmental situations to which relocated or sheltered populations would be exposed and the probable health, medical, and safety problems that they might encounter.

B. Handbook Format Determination

Due to the extensive use of algorithms in the prototype handbook, a discussion of their development and use is presented below.

For several years civil preparedness planners have used the computer to store and process health and medical data for a variety of purposes. In this project an attempt was made to use a branch of computer science to make these same data useful both at the local planning level and for the general public. This effort uses algorithms to present health and medical care procedures in a readily usable, easily followed, and quickly understood format, thus simplifying the task of the local planner and getting information to the public in a fast and clear manner.

Knuth points out that:

> "Ten years ago the word 'algorithm' was unknown to most educated people; indeed, it was scarcely necessary. The rapid rise of computer science, which has the study of algorithms as its focal point, has changed all that; the word is now essential. There are several other words that almost, but not quite, capture the concept that is needed: procedure, recipe, process, routine, method, rigmarole. Like these things an algorithm is a set of rules or directions for getting a specific output from a specific input. The distinguishing feature of an algorithm is that all vagueness must be eliminated; the rules must describe operations that are so simple and well-defined they can be executed by a machine. Furthermore, an algorithm must always terminate after a finite number of steps."†

---

*M.N. Laney, P.F. Giles, D.R. Johnston, and E.L. Hill, Management of Medical Problems Resulting from Population Relocation, Vols. I and II. Research Triangle Park, N.C.: Research Triangle Institute, May 1976.

**G. B. Berke and E. Robertson, Management of Medical Problems Resulting from Population Relocation, Vol. III. Washington, D.C.: American National Red Cross, February 1977.

†Donald E. Knuth, Algorithms. Scientific American, Vol. 236, No. 4 (April 1977), p.63.

Traditionally, algorithms were concerned solely with numerical calculations. Experience with computers has shown, however, that the data manipulated by programs can represent virtually anything. Accordingly, the emphasis in computer science has now shifted to the study of various structures by which information can be represented, and to the branching or decision-making aspects of algorithms which allow them to follow one or another sequence of operations, depending on the state of affairs at the time.

There are numerous examples in the literature of the application of algorithms to non-computer and non-numerical usage. Algorithms are particularly useful in simplifying official regulations, legal documents, technological instructions, and almost any kind of diagnostic problems, be it a medical diagnosis or the maintenance of electrical equipment. Algorithms have been used successfully not only in these areas, but also in the areas of pest control, farming, taxation, and building.

Algorithms simplify the decision-making process by use of a sequence of yes/no decisions or and/or statements that are explicit and leave no room for ambiguity. The reader never has to wonder which contingency should be considered next because each answer routes the user to the next question or statement. There is no need for the reader to remember previous decisions and answers, only to react to the directions or questions involved in the decision point at which the reader is located.

When reading a prose version of given material, the reader must determine for himself which contingencies are pertinent to his problem and which ones he can afford to ignore. In working through an algorithm, the reader bypasses contingencies that are not relevant to the characteristics of the case at hand. An algorithm usually covers several contingencies pertinent to the central idea.

In summary, a systematic guide is needed for local planners to provide health, medical, and safety information in the form of a general population handout for those persons relocating from a risk to a host area. One problem to consider was "how to present medically-sound data in a simple, easily understood, and readily applicable format". It is believed that algorithms provide the most useful format for presenting such data to individuals untrained in medical arts.

C. Condition Algorithms

1. Conditions

The first step in defining the conditions to be presented as algorithms was the development of a matrix of diseases (conditions) versus symptoms. Development of the matrix was discontinued when it became apparent that many of the symptoms noted were common to a large number of diseases (conditions), thus indicating that a handbook using algorithms based on symptoms alone would be extremely complicated, if not unworkable. Because of the obvious need to address the primary disease syndrome as well as symptoms (headache, fever, etc.), it was decided that a combination of both symptoms and diseases (conditions) was needed. It was fortunate that the Medical Self-Help data base had already identified most of the conditions that needed to be addressed. Additions and deletions from that group of conditions were made as needed to satisfy the worst-case assumptions set forth earlier. The resulting list of conditions is shown in Table I. Using these conditions also largely eliminates the need for the target population to make differential diagnoses.

2. Design of Algorithms

The next step was to design an algorithm format. The initial format design consisted of a mix of bona fide algorithms to enable the user to identify the medical condition and list (in simple sentence structure) the methods for handling that condition. This design represented an early attempt to minimize space needs and to simplify flow lines.

Fifteen conditions were prepared in this format and were tested on individuals representative of the target population. Results of this testing indicated that this format still placed too much of a burden on the untrained user for decision making and subsequent recall.

In light of the test results, a flow chart format and computer-style algorithms were chosen to help eliminate the need for decision making and/or recall. Simultaneously, efforts were made to coordinate this research program with civil preparedness experts at regional, state, and local levels. Discussions with these experts indicated that a flow chart format with computer-style algorithms would be eagerly received at the various planning levels and that every effort should be made to expand the source data into that format.

This series of events and the results of the individual target population testing strongly reinforced the original premise that simplification of medical self-help information would significantly contribute to the emergency care and health of the general public in situations where trained medical care was unavailable.

3. Semantics

It was recognized at the outset that semantics would have much to do with the effectiveness of the materials developed. With this in mind, the project staff met with Dr. Karl R. Reinhard, Office of Research and Development, Indian Health Service, Tucson, Arizona in January 1977. Dr. Reinhard is a recognized public health expert with years of experience in providing health care guidance to lower socio-economic level members of the public. Through his experience in the development of lay reporting systems for Native Americans in Alaska and Arizona, he is acutely aware of the semantic problems that must be overcome if effective communication is to occur.

Dr. Reinhard concurred with the program objectives and confirmed our decision relating to the algorithm format. Not surprisingly, he agreed with our assessment that ethnic, local, and colloquial terminology must be incorporated to make the product, and specifically the index, easy to use. His evaluation reinforced our belief that this project could result in a document useful to the general population in coping with a disaster.

Next, an index was generated using the MSH data base, and augmented by such other synonyms as we felt were relevant. It was, of course, apparent that the index was not national in coverage; hence, additional inputs are needed in order to satisfy regional and local needs.

4. Prototype Handbook

While designing the condition algorithms, it was found that some treatments were common to more than one algorithm. Therefore, in an attempt to save space and simplify instructions regarding medication, it was decided to place information on the most frequently used medications, their dosages, and instructions for their preparation in an appendix to the handbook. It was also decided to test the use of an algorithm format as an introduction to the handbook with the hope that it would improve the users ability to use the condition algorithms. This also makes the introduction consistent in

format with the condition algorithms and theoretically will increase the effectiveness of the handbook while decreasing learning time.

Therefore, for test purposes, we constructed a format derived from a variety of publications such as telephone directories and medical literature. The final format consists of an introductory algorithm on the front cover of the handbook (Figure 1); condition algorithms for the 51 conditions listed in Table I; and a center-located index (Figure 2) listing tab numbers. The tab numbers are located on a strip along the leading edge of the inside back and front covers, and they are placed directly in line with a numbered tab on the appropriate algorithm. The tab numbering scheme is illustrated in Figure 3.

To operate this format, the user reads the introductory algorithm that leads him/her to the index where he/she identifies the condition in which he/she is interested. The condition, thus located, has a number which is found by thumbing the numbered strip on the leading inside edges of the covers, and opening the document to the darkened tab that has the same number on the leading edges of the pages containing the algorithms.

Illustrative condition algorithms for heat emergencies and bleeding are shown in Figures 4 and 5, respectively.

A prototype handbook, prepared as described above, was field tested on a group of 60 subjects at Portsmouth, Virginia. The test consisted of giving the test subjects sample cases to solve using the prototype handbook. A sample case dealing with childbirth is shown in Figure 6. Each subject/case is scored by determining the number of algorithm steps correctly negotiated out of the total number of steps. The results of the field test are summarized in Appendix A. The project staff asked the test subjects to write down their feelings about the handbook and the test experience. Their comments are included in Appendix B.

Table I. Conditions Selected for Inclusion in Prototype Handbook

Abscesses	Headache
Alcoholism	Head Injuries
Allergies	Heart Conditions
Asthma Attack	Heart Emergencies
Bites	Heat Emergencies
Bleeding, External	Hernia
Bleeding, Internal	Indigestion
Blisters	Muscle Strain
Broken Bones	Nausea and Vomiting
Burns	Nosebleed
Chest Pain	Pain
Childbirth	Parasites, External
Chills	Poisoning
Choking	Carbon Monoxide Poisoning
Common Cold	Radiation Sickness
Convulsions	Shock
Croup	Skin Rash
Death	Sore Throat
Diabetic Emergencies	Stomach Ache
Diarrhea	Stroke
Drug Addictions	Swelling
Earache	Toothache
Emotional Problems	Unconsciousness
Eye Problems	Urinary Problems
Fever	Wounds
Frostbite	

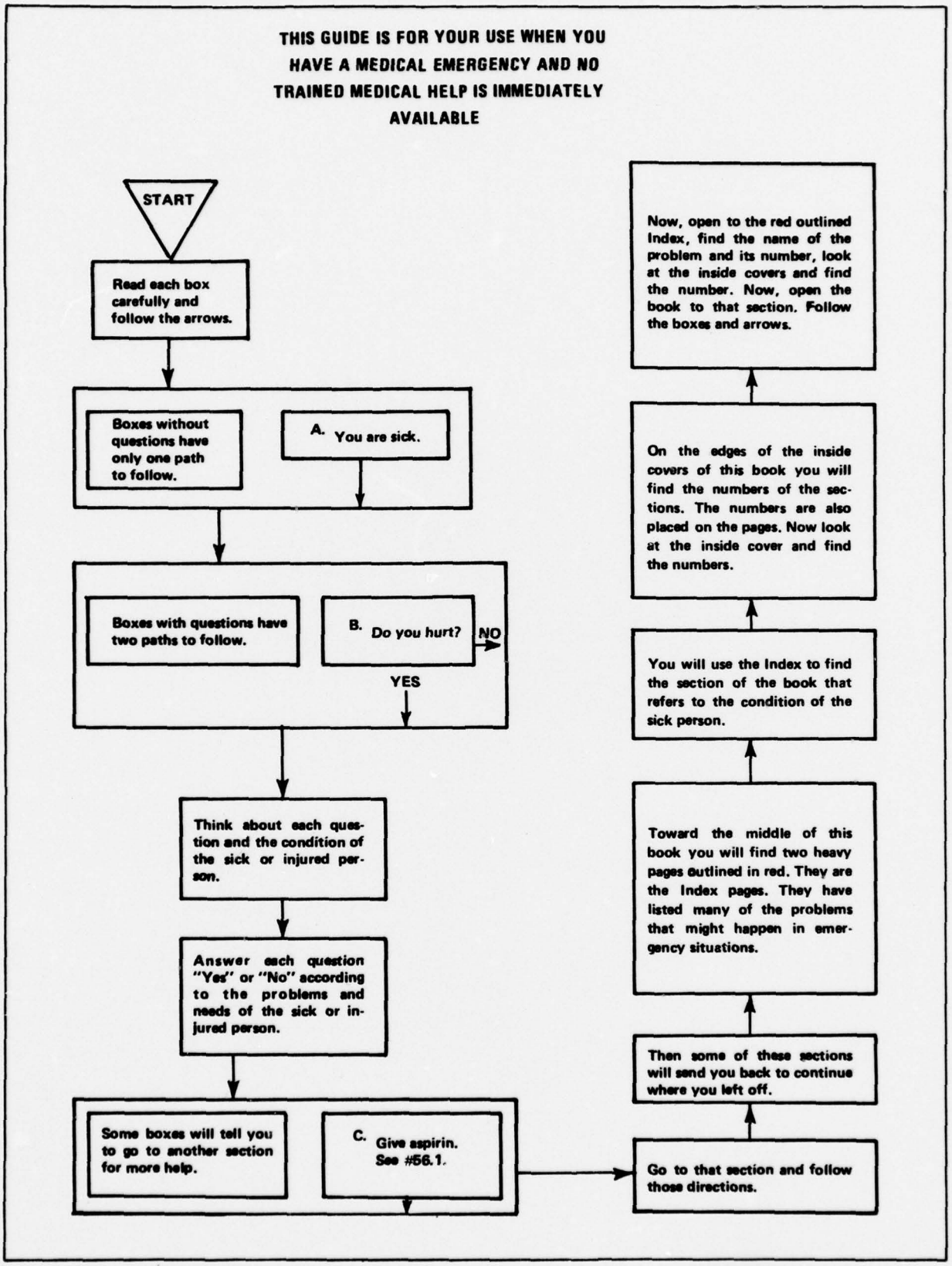


Figure 1. Front Cover of Handbook Showing Introductory Algorithm

INDEX

	Tab Number
A	
Abdomen, Pain (Use Stomachache)	45
Abscesses	1
Abrasions (Use Wounds)	51
Addictions (Use Drug Addictions)	21
Alcoholism	2
Allergies	3
Angina (Use Heart Emergencies)	30
Animal Bites (Use Bites)	5
Apoplexy (Use Stroke)	46
Appendicitis (Use Stomachache)	45
Artificial Respiration	52
Asthma Attack	4
B	
Back, Broken (Use Broken Bones)	9
Bee Stings (Use Bites)	5
Birth (Use Childbirth)	12
Bites	5
Bladder and Kidney (Use Urinary Problems)	50
Bleeding, External	6
Bleeding, Internal	7
Blisters	8
Boils (Use Abscesses)	1
Bones, Broken	9
Breathing (Use Artificial Respiration)	52
Choking	14
Croup	17
Heart Emergencies	30
Broken Bones	9
Bruises (Use Wounds)	51
Burns	10
C	
Carbon Monoxide Poisoning	40
Carbuncle (Use Abscesses)	1
Chest Pain	11
Childbirth	12
Chills	13
Choking	14
Coma (Use Death)	18
Diabetic Emergencies	19
Stroke	46
Common Cold	15
Contusions (Use Wounds)	51
Convulsions	16
Coughing (Use Croup)	17
Cramps (Use Heat Emergencies)	31
Croup	17
Cuts (Use Wounds)	51
D	
Death	18
Dehydration (Use Diarrhea)	20
Burns	10
Shock	42
Nausea and Vomiting	35
Diabetes (Use Diabetic Emergencies)	19
Diabetic Emergencies	19
Diarrhea	20
Dislocation (Use Broken Bones)	9
Dog Bites (Use Bites)	5
Drug Addicts	21
Dyspepsia (Use Indigestion)	33
E	
Earache	22
Emotional Problems	23
Eye Problems	24
F	
Fever	25
Fits (Use Convulsions)	16
Fractures (Use Broken Bones)	9
Frostbite	26
Furuncle (Use Abscesses)	1
H	
Hay Fever (Use Allergies)	3
Headache	27
Head Injuries	28
Head Wounds (Use Wounds)	51
Heart Attack (Use Heart Emergencies)	30
Heartburn (Use Indigestion)	33
Heart Conditions	29
Heart Emergencies	30
Heat Emergencies	31
Heat Prostration (Use Heat Emergencies)	31
Heat Stroke (Use Heat Emergencies)	31
Hemorrhage (Use Bleeding, External)	6
Bleeding, Internal	7
Wounds	51
Hernia	32
Hives (Use Allergies)	3
Skin Rash	43
I	
Indigestion	33
Itching (Use Parasites)	38

Figure 2. Part of the Center-Located Index

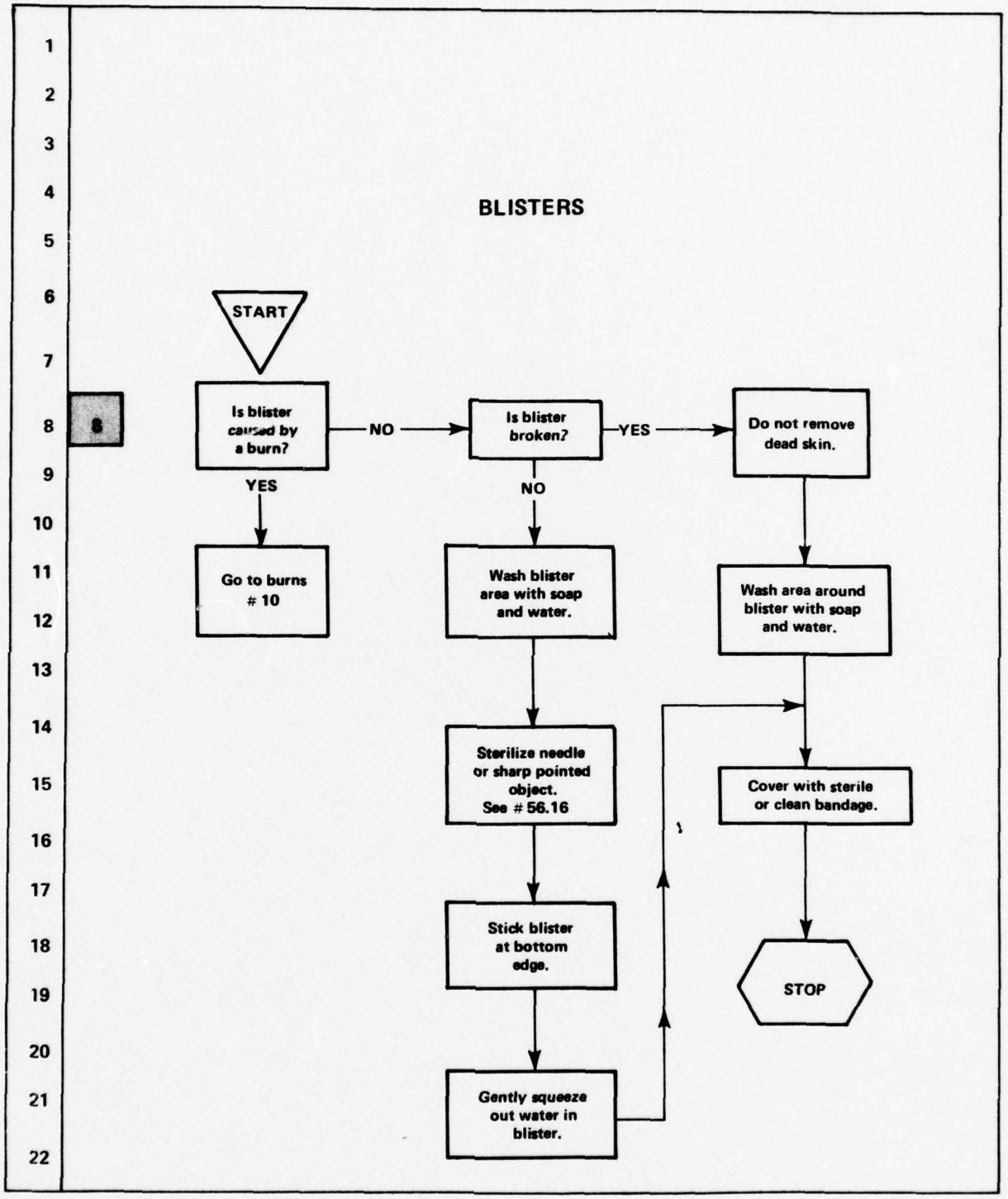


Figure 3. Tab Numbering in Prototype Handbook

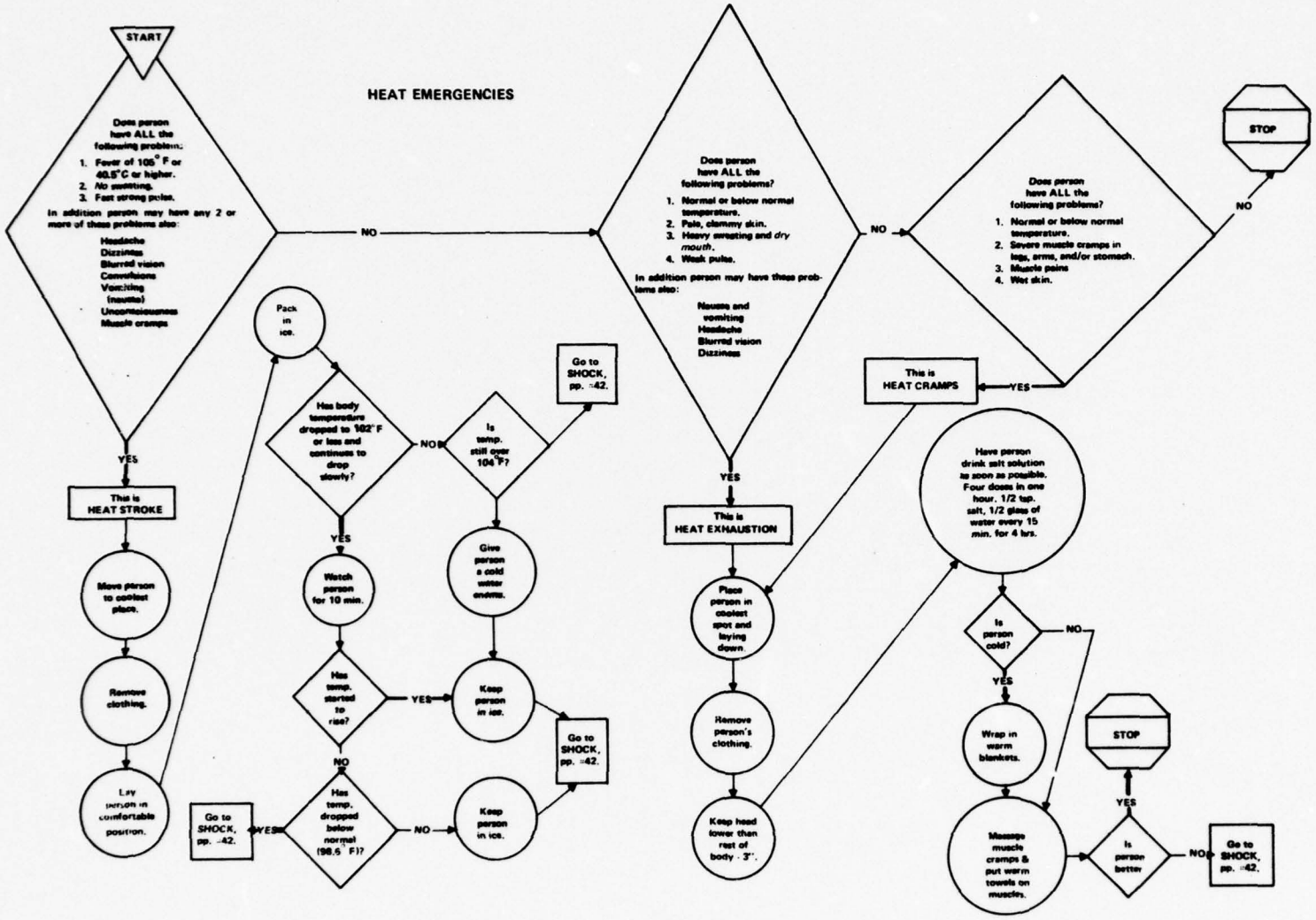
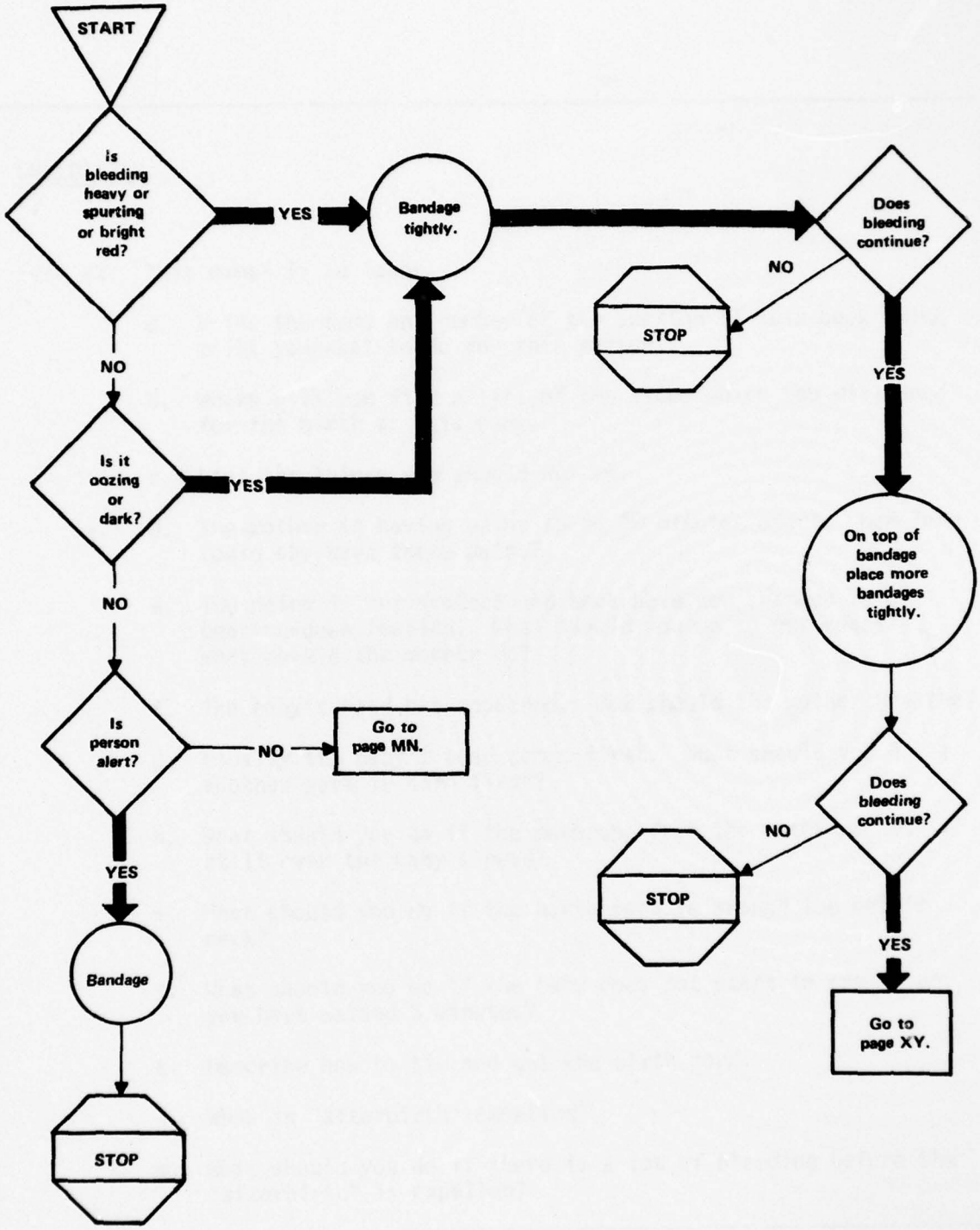


Figure 4. Condition Algorithm for Heat Emergencies

BLEEDING



Page XY:	Shock
Page MN:	Pressure point illustrations

Figure 5. Condition Algorithm for Bleeding

CHILDBIRTH

Case #2: This woman is in labor.

a. Write the name and number of the section of this book which tells you what to do for this person.

b. Where will you find a list of the items which you will need for the birth of this baby.

c. List the things you should NOT do.

d. The mother is having pains 10 to 20 minutes apart. How long could she have these pains?

e. The pains in her stomach and back have now changed to a bearing-down feeling. What should you do to get ready? What should the mother do?

f. The baby's head has appeared. How should the mother breathe?

g. Usually the baby's head comes first. What should you do if another part is born first?

h. What should you do if the membrane from the water sac is still over the baby's head?

i. What should you do if the birth cord is around the baby's neck?

j. What should you do if the baby does not start to cry after you have waited 3 minutes?

k. Describe how to tie and cut the birth cord.

l. When is "afterbirth" expelled?

m. What should you do if there is a lot of bleeding before the "afterbirth" is expelled?

Figure 6. Sample Case Used in Test of Prototype Handbook

D. Life-Threatening Conditions

Gravely ill or injured patients, i.e., those whose lives are threatened, may require professional medical care if they are to survive. If no care is available in the shelter where the patient is located, but it is known that professional services are available at a facility (e.g., hospital, shelter) a short distance away, then it may be appropriate to transport the patient to that facility. In the immediate postattack period it is imperative, of course, that the radiation dose rate outside the shelter be known and considered before venturing forth on such a mission. The concern for radiation exposure here is primarily for the person or persons assisting the patient and only secondarily for the patient himself--the community gains little if those rendering assistance to a patient who may die anyway acquire radiation sickness in payment for their efforts. Thus, it was felt that guidance should be provided for the individual confronted with making a decision regarding the transport of patients with life-threatening conditions to facilities where professional care is available. Such guidance is presented as an algorithm in Figure 7.

1. Radiation Exposure Guide

The radiation exposure guide that is central to the algorithm shown in Figure 7 only considers the doses received by the person(s) transporting the patient. The assumptions made for calculating radiation exposure doses are as follows:

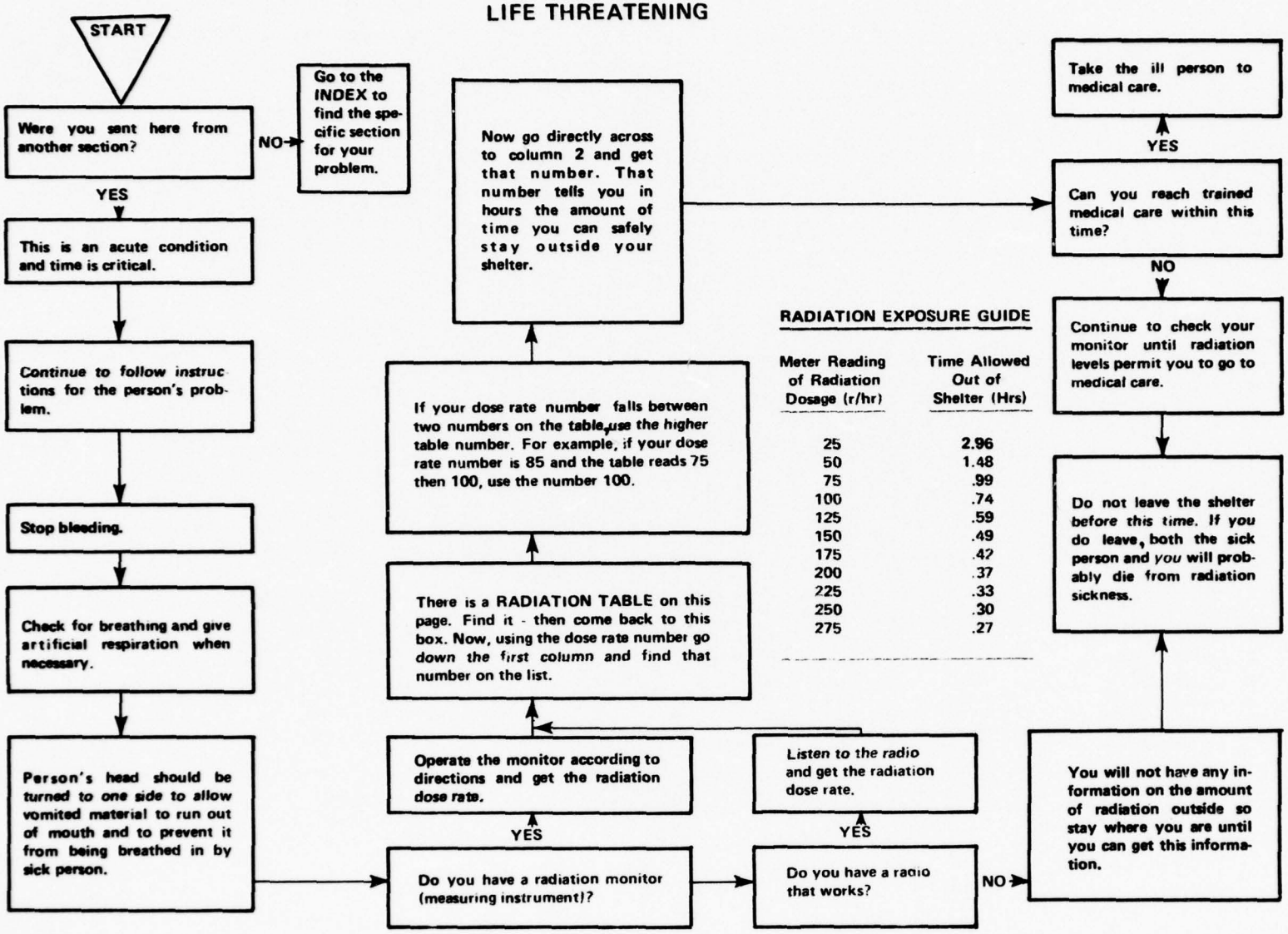
- Radioactive decay is zero during a mission.
- No recovery, as in the Equivalent Residual Dose concept, takes place.
- Measurement error is -35%.*
- Total dose should not exceed 100r.†

---

*Exposure to Radiation in An Emergency, National Committee on Radiation Protection and Measurements, Report No. 29, January 1962.

†Federal Civil Defense Guide, Part E, Chapter 5, Appendix 1 suggests that the dose to the general public should be kept below 100r. Since the individual to which the radiation exposure guide is addressed is not a trained emergency worker and therefore is probably not fully informed of the risks of radiation exposure, setting total dose equal to 100r, the suggested limit for the general public, seems appropriate and reasonable.

LIFE THREATENING



RADIATION EXPOSURE GUIDE

Meter Reading of Radiation Dosage (r/hr)	Time Allowed Out of Shelter (Hrs)
25	2.96
50	1.48
75	.99
100	.74
125	.59
150	.49
175	.42
200	.37
225	.33
250	.30
275	.27

Figure 7. Life-Threatening Condition Algorithm

Since it is believed that these assumptions are conservative, the calculation of radiation doses received will err on the side of safety.

2. Calculation

With the assumptions listed above, dose (D) is given by:

$$D = 1.35\ rt$$

where:

r = dose rate (r/hr)
t = time (hr)

To obtain total mission time, rearrange the equation, set D = 100r, and solve for

$$t = D/1.35r\ .$$

For example, at a dose rate of 25r/hr mission time is

$$100r/1.35 \times 25r/hr = 2.96\ hr\ .$$

III. CONCLUSIONS

The document's introductory algorithm provides the user guidance in terms of the document's contents and functions. Test results indicate that the use of algorithms alone to teach the use of algorithms is less effective; that is, more time consuming than if algorithms are included within a few self-instructional frames so that the user is "walked through" an algorithm before being expected to function with the entire handbook.

The index proved to be well designed and was easily used by the test subjects. The major problem with the index is that the subject terms are not sufficiently comprehensive as to make the index effective in all regions among all ethnic groups of the United States. In order to overcome this problem, several options are available. The best of these options are to: (1) enlist the assistance of the States via the DCPA Regional Offices in providing local terms synonymous with the technical terms of the conditions listed in the current index, (2) use the current index, augumented as feasible by the DCPA staff, and instruct local planners to expand the index to encompass their own local needs, (3) enlist the assistance of a language expert to develop a list of terms that could be used and understood nationwide, or (4) provide the current index to a group of experienced emergency physicians, such as the American College of Emergency Physicians, and ask them to supply the needed ethnic, regional, and colloquial terms.

As noted previously, the positioning of the index at the center of the handbook proved to be less satisfactory than expected. Testing indicated that the index would probably be more easily understood if it were placed in front of the condition algorithms and compatibly linked with the introduction.

The decision to place information on dosages, bandaging, splinting, etc., in the appendix was made arbitrarily in order to save space and simplify the use of the handbook. However, testing showed that the need for the user to have an algorithm, go to the appendix, and return to an algorithm resulted in confusion, frustration, and loss of time.

It is obvious from our experience that many of the items currently located in the appendix should be moved to the condition-algorithms where they are applicable. Information on dosages, bandaging, splinting

instructions, etc., should be incorporated within the specific algorithm where they are referenced, except for those unusual cases which require graphics or extensive instructions. Those special materials should be located on the page adjacent to the pertinent algorithm.

The development of the condition algorithms was covered earlier. Suffice it to say at this time that testing proved that algorithms could be used by the general public to provide medical self-help in situations where no trained medical care is available.

The prototype handbook is unusual in that it can be used both as a performance aid for those with first aid knowledge, and as a tool to provide guidance (minimizing mistakes) for the well-intentioned but uninformed individual.

Our research findings and experience during the course of this effort indicate that the following considerations could materially increase the usefulness of the condition algorithms:

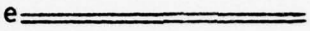
- In the prototype handbook, DO NOTS (those things which a person may have heard are good to do but which are definitely contra-indicated) are listed at the top of each algorithm, to be read before starting the algorithm proper. The utility of such instructions and their location in particular has been questioned, since there is some indication that readers tend to ignore them. Alternate solutions are possible, including eliminating these warnings or including them within the body of the algorithm (such as listing them immediately after START or as they affect decision points).
- The START and STOP points must be unique in appearance for quick identification. The START box as used in this project is unique and has proved to be very effective. Although the STOP box worked well during testing, it may be made more effective by adopting the standard highway "Stop Sign" designation.
- Even though the rectangles used for decision points, instructions, and exit-and-return directions tested well, different geometrical forms such as circles, trapezoids, and ovals should be examined to see if they can increase the algorithm's effectiveness.

- The flow of lines, boxes, arrows, and words is very important in order to minimize mistakes. To keep reproduction costs down, an investigation should be made of the use of various graphic styles such as:
  - Arrow lines and box outlines of varying widths
  - Lines of different styles:

    Dotted . . . . . .

    Solid _____

    Waving

    Double 

    Dashed - - - - - - - - -

  The testing also showed that direction of flow into and out of the boxes is important. Flow should be top to bottom and left to right, in accordance with American usage, if at all possible.
- Close coordination with graphics experts to ascertain the optimal means of accomplishing information transferral is necessary. The use of differing geometric forms, flow arrows, and lines; the positioning of algorithms on a single and/or multiple page format should be investigated. Consideration of these factors must include the proposition that the user may be attempting the procedure while under great stress.
- Size and type of print should be considered to insure readability.

Facts that may limit the success of the format used to date are: (1) the physical structure of the handbook did not allow it to open automatically to the center-located index, (2) the cost of using die-cut tabs could be prohibitive for a local level budget, and (3) the use of an appendix for dosages, bandaging instructions, etc., caused a break in the logical flow of the algorithms.

Therefore, this format is probably not suitable for the general public and should be reserved for scientific and professional-level use.

IV. RECOMMENDATIONS

The principal recommendation arising from this study is that work should be continued to develop a handbook along the lines of the prototype described in this report. If the decision is made to proceed with the development of a handbook, the authors specific recommendations for increasing handbook effectiveness are:

- There is a need for additional instruction on how to use the manual. This information could be in the form of a printed introduction, giving concrete examples of situations in which the manual could be used. Some practice in applying the algorithms to a given situation should be included in the prototype handbook. It would be helpful to have feedback, within the document, as to the correct path for coping with a given situation.
- While the average test subject was able to follow the flow of the algorithms, better instructions are necessary in the front of the manual, e.g., instructions that actually walk the reader through at least one correct algorithm. In addition, since Americans are used to reading from top to bottom and left to right; this sequence should be followed as closely as possible.
- If two indexed terms describe the same condition, both terms should be used on the algorithm page (e.g., where abdomen pain and stomach ache are both listed in the index, both also should be listed on the algorithm).
- Dosage and bandaging instructions should be located on the page on which the algorithm is printed. Any suggested dosage should be keyed to the appropriate place in the algorithm. The possibility of developing bandaging and splinting into modified algorithms with graphics should be investigated. In any event, whichever format proves effective, it should be located adjacent to the pertinent algorithms.
- Space should be provided to fill in important information such as the location and phone number of the hospital, the police department, and the fire department.

- In the continuing development of a handbook for use by the general population, care should be taken to redesign the prototype graphics considering ethnic and cultural factors, and using simple characters similar to those used by the American National Red Cross.
- In final production, the package needs to be made attractive to the user. Illustrations need to be added that are specific to the problem or condition being presented and print sizes should be varied as appropriate.
- Large (14 pt. or larger) print should be used, if possible. If algorithms must be reduced for printing, the original print should be larger than 14 point. Also, print may be easier to follow if it is serif in both capital and lower case letters. Important points could be all capital letters and, possibly, sans-serif. The asterisk in front of major points is somewhat confusing. It is suggested that these be numbered or partially underlined.
- Bold typeface should be used to differentiate between the yes and no portions of the algorithms (with bold typeface preferably on the yes portion). Also, bold typeface should be used for signs, symptoms, important points, and special cues.
- The algorithms should be reviewed for content validity by an advisory panel consisting of three to five medically trained and nationally recognized subject matter experts. Each algorithm should be reviewed by the panel for (1) completeness, (2) accuracy, (3) acceptability of practices, and (4) availability of supplies. The final review should be made by the National Academy of Sciences or a like group.

By implementing the above recommendations, the handbook should have a smooth logical flow beginning with the introduction, which uses a few self-instructional frames to familiarize the user with algorithms, then leading directly into the index where he/she determines the location of the required condition algorithm. Upon turning to that algorithm, the user encounters a starting point that leads through a logical progression of as many algorithms as necessary in any particular case to reach a terminal point without the necessity of backtracking.

APPENDIX A: FIELD TEST RESULTS

PROTOTYPE HANDBOOK FOR CRISIS RELOCATION PLANNERS

APPENDIX A: FIELD TEST RESULTS

PROTOTYPE HANDBOOK FOR CRISIS RELOCATION PLANNERS

The attached matrix of results provides the raw data that resulted from the field test. As an explanation of these results consider Case #1. For Case #1, the maximum score that could be obtained was 8. Wherever there is a dash in the block to the left of the slash mark [i.e., (-/8)], the reader did not have time to even attempt the case and attained no score. When the reader did attempt the case and attained no score, the reader received a score of zero (0/8). See example, student A-1, Case #1, and student A-10, Case #1. Student A-4 scored a maximum of 8 points on Case #1, as did student A-13.

The C group of subjects was a senior citizen group that was available for the field test; it was later determined that this particular group (C) was not appropriate as a test group because they tended to reject algorithms out of hand.

FIELD TEST RESULTS

PROTOTYPE HANDBOOK FOR CRISIS RELOCATION PLANNERS

Student	Case #																
	1	5	8	11	14	17	20	23	28	30	33	34	41	45	49	55	
A-1	-/8	-/5	0/2	3/3	4/4	2/5	1/1	2/2	0/3	3/3	-/5	4/4	2/2	3/4	-/4	-/5	
A-2	-/8	-/5	-/2	2/3	0/4	0/5	1/1	2/2	3/3	0/3	-/5	4/4	0/2	4/4	-/4	-/5	
A-3	-/8	-/5	-/2	-/3	-/4	-/5	-/0	-/2	0/3	3/3	-/5	0/4	0/2	3/4	-/4	-/5	
A-4	8/8	5/5	2/2	3/3	4/4	5/5	1/1	2/2	3/3	3/3	-/5	4/4	2/2	4/4	0/4	0/5	
A-5	-/8	-/5	-/2	0/3	2/4	5/5	0/1	0/2	0/5	1/3	-/5	3/4	1/2	3/4	-/4	-/5	
A-6	-/8	-/5	-/2	-/3	3/4	4/5	1/1	2/2	2/3	3/3	-/5	3/4	2/2	3/4	-/4	-/5	
A-7	-/8	-/5	-/2	1/3	3/4	4/5	1/1	1/2	3/3	3/3	-/5	3/4	2/2	4/4	-/4	-/5	
A-8	-/8	-/5	-/2	-/3	-/4	-/5	-/1	-/2	-/3	-/3	-/5	0/4	-/2	3/4	-/4	-/5	
A-9	-/8	-/5	-/2	-/3	-/4	3/5	1/1	2/2	3/3	6/6	-/5	0/4	2/2	4/4	-/4	-/5	
A-10	0/8	1/5	0/2	2/3	1/4	1/5	1/1	1/2	2/3	0/3	2/5	0/4	1/2	2/4	0/4	1/5	
A-11	4/8	5/5	1/2	3/3	2/4	4/5	5/5	2/2	3/3	3/3	-/5	3/4	2/2	3/4	-/4	-/5	
A-12	2/8	4/5	2/2	0/3	3/4	0/5	0/1	1/2	3/3	3/3	-/5	4/4	2/2	2/4	-/4	-/5	
A-13	8/8	5/5	2/2	3/3	3/4	5/5	1/1	2/2	3/3	2/2	-/5	4/4	2/2	4/4	4/4	5/5	
A-14	4/8	3/5	2/2	2/3	4/4	5/5	1/1	2/2	3/3	3/3	-/5	4/4	2/2	4/4	3/4	5/5	
A-15	7/8	5/5	2/2	3/3	4/4	2/5	0/1	2/2	3/3	3/3	-/5	2/4	2/2	4/4	-/4	-/5	
A-16	0/8	3/5	2/2	-/3	4/4	3/5	1/1	2/2	3/3	3/3	-/5	4/4	2/2	4/4	-/4	-/5	

Student	Case #																	
	3	6	7	9	10	12	13	15	16	18	19	21	24	25	26	27	29	
B-1			5/5		3/3		4/6				3/3		2/2	3/4		2/3		
B-2	0/3	0/5		0/5		0/2		0/11	0/3	2/3		4/5			0/8		5/6	
B-3	3/4	0/5		1/4		0/2		0/11	3/3	1/3		0/5			1/8		5/6	
B-4	-/4	-/5		-/4		-/2		-/11	-/3	-/3		0/5			8/8		3/6	
B-5	4/4	5/5		4/4		2/2		6/11	-/3	-/3		3/5			1/8		4/6	
B-6	4/4	5/5		4/4		2/2		11/11	-/3	4/4		5/5			8/8		5/6	
B-7	-/4	-/5		-/4		0/2		3/11	-/3	-/3		4/5			0/8		5/6	
B-8	-/4	-/5		-/4		-/2		0/11	-/3	0/3		2/5			0/8		3/6	
B-9	-/4	-/5		-/4		-/2		-/11	-/3	-/3		4/5			8/8		1/6	
B-10	4/4	0/5		4/4		1/2		7/11	3/3	1/3		3/5			0/8		5/6	
B-11	4/4	3/5		4/4		2/2		7/11	-/3	3/3		4/5			8/8		5/6	
B-12	4/4	5/5		4/4		2/2		3/11	3/3	2/3		3/5			1/8		3/6	
B-13		4/5		4/4		0/2		5/11	-/3	0/3		5/5			1/8		6/6	
B-14	-/4	-/5		-/4		-/2		6/11	-/3	3/3		5/5			8/8		5/6	
B-15	4/4	0/5		4/4		2/2		11/11	3/3	2/3		5/5			1/8		4/6	
B-16																		
B-17																		

Student	Case #																	
	31	32	35	36	37	38	39	40	42	43	44	46	47	48	50	51	52	53
B-1		4/8				-/3	3/4	-/5		-/3	0/3			-/3	-/4	0/6	2/2	
B-2	0/2		0/3	1/4	3/3				2/3			3/3	1/2				1/2	
B-3	0/2		0/3	1/4	0/3				2/3			2/3	1/2				2/2	
B-4	1/2		-/3	-/4	3/3				3/3			6/7	-/2				2/2	
B-5	2/2		3/3	4/4	3/3				2/3			5/7	2/2				2/2	
B-6	2/2		3/3	-/4	0/3				3/3			7/7	0/2				2/2	
B-7	1/2		-/3	-/4	3/3				3/3			5/7	-/2				0/2	
B-8	1/2		-/3	-/4	3/3				2/3			1/3	-/2				1/2	
B-9	-/2		-/3	-/4	3/3				3/3			0/3	-/2				1/2	
B-10	2/2		3/3	4/4	3/3				2/3			7/7	2/2				2/2	
B-11	2/2		3/3	4/4	3/3				3/3			1/3	0/2				2/2	
B-12	1/2		1/3	4/4	0/3				1/3			3/7	0/2				2/2	
B-13	1/2		-/3	-/4	0/3				2/3			7/7	-/2					2/3
B-14	2/2		-/3	-/4	3/3				3/3			7/7	-/2				2/2	
B-15	2/2		2/3	4/4	0/3				2/3			7/7	0/2				2/2	
B-16																		
B-17																		

Student	Case #																	
	1	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
D-1		-/4			-/4			-/4			-/3			-/6	-/6		-/4	
D-2			-/3			-/6			-/3			-/6						0/3
D-3			3/3			6/6			1/3			4/6						3/3
D-4	-/6			-/4			-/3			-/3			-/4			-/4		
D-5		-/4			-/4			-/4			-/3			-/6	-/6		-/4	
D-6	6/6			4/4			2/3			3/3			0/4			4/4		
D-7		-/4			-/4			-/4			-/3			6/6	-/6		4/4	
D-8		3/4			4/4			4/4			3/3			6/6	-/6		4/4	
D-9	-/6			-/4			-/3			-/3			-/4			4/4		
D-10		-/4		-/4				-/4			-/3			-/6	-/6		-/4	
D-11		0/4			2/4			4/4			3/3			0/6	-/6		2/4	
D-12			3/3			6/6			3/3			5/6						3/3
D-13			3/3			0/6			3/3			0/6						
D-14			-/3			-/6			-/3			-/3						-/3
D-15			-/3			-/6			-/3			-/6						-/3
D-16			-/3			-/6			-/3			-/6						-/3
D-17			-/3			-/6			-/3			-/6						3/3

Student	Case #																	
	20	21	22	24	25	26	29	30	31	32	33	34	35	36	37	39	40	41
D-1		5/5	-/3			8/8			0/2				-/3	-/4	3/3			
D-2				2/2	3/4					2/5						3/3	-/5	
D-3				1/2	4/4					0/5						3/3	-/5	
D-4	-/2							2/2			-/5	4/5						2/4
D-5		-/5	-/3			-/8			-/2				-/3	-/4	0/3			
D-6	2/2							2/2			0/5	0/5						4/4
D-7		0/5	-/3			8/8			2/2				-/3	-/4	3/3			
D-8		5/5	-/3			1/8			1/2				-/3	-/4	0/3			
D-9	2/2							0/2			-/5	3/5						2/4
D-10		-/5	-/3			-/8			0/2				-/3	-/4	3/3			
D-11		0/5	-/3			-/8			-/2				1/3	-/4	3/3			
D-12				2/2	4/4					5/5						3/3	-/5	
D-13																	0/5	
D-14				0/2	4/4					0/5						2/3	-/5	
D-15				-/2	-/4					2/5						3/3	-/5	
D-16				-/2	-/4					5/5						3/3	-/5	
D-17				2/2	4/4					5/5						2/3	-/5	

Student	Case #																		
	42	43	44	46	47	48	52	53	55										
D-1	3/3			5/6	-/2		2/2												
D-2		-/5	2/3			-/4		3/3											
D-3		-/5	2/3			-/4		0/3											
D-4									-/5										
D-5	2/3			5/6	-/2		1/2												
D-6									5/5										
D-7	2/3			6/6	-/2		2/2												
D-8	3/3			1/6	-/2		0/2												
D-9									-/5										
D-10	2/3			6/6	-/2		2/2												
D-11	-/3			0/6	0/2		2/2												
D-12		-/5	3/3			4/5		1/3											
D-13		-/5				4/5													
D-14		-/5	3/3			-/4		2/3											
D-15		-/5	3/3			-/4		3/3											
D-16		-/5	0/3			-/4	2/2												
D-17		-/5	3/3			-/4		2/3											

APPENDIX B: TEST SUBJECTS COMMENTS ON PROTOTYPE HANDBOOK

APPENDIX B: TEST SUBJECTS COMMENTS ON PROTOTYPE HANDBOOK

I found it very interesting and educational. Wish we had a longer time to complete it all.

I think it's remarkable and would like to see it through. Had no problem finding answers - (hope they are right). I learned a lot.

Think it is very well prepared. Only troubled about the first section, but did not take but one minute after reading it over. Very interesting.

This is a very challenging project. I found most instructions easy to follow.

I had trouble finding the right answers in the book.

I think it is a good program. Right on.

Very helpful and educational. Should be done on a nationwide scale. Very helpful to me as an individual. Thank you.

Have trouble getting to book. Good program.

I think this is a nice program. At first I had difficulty trying to figure out what was going on, but once I really got involved it became easier. I think it helps a lot.

Very necessary.

I feel this is very helpful.

I think this test was very useful to me and I would like to take a course on this in more detail. It was a little hard to follow at first, but once I got into the problems it was easier.

I think this has been most beneficial to me personally. The index could be revised, but basically a very good and informative session.

Note should be made that some treatment is for long range and not immediate medical help. To be contrasted with First Aid and paramedic training as given. More medical self help is necessary for the populace of this country.

Book is fairly easy to follow and would be a great help if books like these were kept in the home after it is re-evaluated and re-published.

Some things need clarification.

I think this has been a very well put together program. I enjoyed working on this project.

I think the book is very well put together. It not only gives very good information but gives good further references. All things should be considered when a person is sick. The directions are very easy to follow. I found no difficulty following them. The help from the directors is efficient. Every citizen should review these booklets.

---

1. This book was good in the order that it is in. I had no problems. It was easy.
2. The arrows were easy to follow.
3. The layout of the book is very understanding.

I find this workshop helpful. The wording might be made a little more simple for those who take longer to understand, especially if this is to be used in emergency situations. Index should be in front.

I believe that the book is basically a good idea. Easy to read and follow. All suggestions I have are in the margins of this test. Good luck on the trouble-shooting. When you're finished, send me one. Need tabs for sections on finished product.

Very good, very easy. The layouts were very understandable.

The index was very good. Some of the arrows were hard to follow when you had to refer to other pages and come back.

The layout of the book is satisfactory. Arrows and numbers were fine. The overall book is very good.

---

1. The idea of the reference in the middle was good as it allowed you to move easy in both directions.
2. Once I got the hang of the arrows, it worked well. It is a good idea.
3. The tabs on the pages are difficult to read. Good booklet.

The Index should be in the front. Tabs should be on each page. Going from one section to another was not difficult. Following the areas would be easier if better spaced apart. The problems seem to be quite realistic.

The Index in the middle is very good. Numbers on edge of page - very good. Very easy to follow arrows.

In as far as the format of the book relating to the Index, I don't think changing to the front or the back would be particularly helpful. It seems fine as it is and is easy to use. The way the arrows are arranged and the block we had of step by step instruction is to a point confusing. However, it would seem to be the easiest and less confusing of any I can think of as there are options to choose from which change the steps to be taken. I feel that such a manual would be useful and helpful in such a disaster or emergency as might occur. I do feel it would have to have a larger amount of generalities in the Index however.

Enjoy the medical discussion very much.

Format good. Too many cases given to answer in a limited time.

I think it would have been much more educational if Dr. Suess had discussed the matter.

I think this is a fine study and educational. However, I think that this would require study beforehand so you could approach it better knowing what and how to search for answers.

Very good.

The Index is not in order.

It's a challenge - tagalog. Poorly constructed for an average lay person. The information is good. Extra information sheets should be incorporated in the booklet.

I believe the idea is very good, but I am of the opinion that more time would be required to understand the questions and answers.

I think it's a waste of time and paper.

I think it's very important.

I think the book is very good. The layout of the book can be followed very well. It is useful. It could be used in any trouble. Hope to see them in every home.

I am sure it is a real challenge.

Very explanatory. Very useful.

---

1. If possible, simplify algorithms. 2. Add certain terminology to Index.

This book needs some improvement, but overall it serves a purpose.

The format wasn't difficult. It was very easy to comprehend. I was trying to study it.

I think the Index should be in front of the book. The arrows were okay to me.

I think this book is an outstanding tool for the "untrained" in First Aid and would like to see it published.

I think the book is okay, but in case of emergency it should be layed out differently because some people aren't smart enough to follow directions. So it should be related differently for those types of people.

Would prefer a book with contents in front of book and index in back and written up in paragraph form to explain what to do.

Book was easy to read and follow.

Arrangement of book - good. Not enough specifics in case study information. Too general.

Arrangement of book - satisfactory. This book presented no real problems in following. Case studies could have been a little more informative in trying to analyze closely related problems.

I believe this is a very worthwhile project. I learned a great deal just participating in this test. Personally, I would like to see a book of this nature sold to the general public. I found it easy to understand and had no difficulty following instructions. I believe I would like to see the index area in front as a table of contents and tabs on pages like a dictionary has letters. You might want to cross-reference the index a little more as to synonomous names, such as common names for the same conditions. All in all, I find it very simple, instructive and educational.

DISTRIBUTION LIST

Addresses	Number of Copies
Defense Civil Preparedness Agency Research ATTN: Administrative Officer Washington, D.C. 20301	50
Assistant Secretary of the Army (R&D) ATTN: Assistant for Research Washington, D.C. 20301	1
Chief of Naval Research Washington, D.C. 20360	1
Commander, Naval Supply Systems Command (0421G) Department of the Navy Washington, D.C. 20376	1
Commander Naval Facilities Engineering Command Research and Development (Code 0322C) Department of the Navy Washington, D.C. 20390	1
Defense Documentation Center Cameron Station Alexandria, Virginia 22314	12
Civil Defense Research Project Oak Ridge National Laboratory ATTN: Librarian P.O. Box X Oak Ridge, Tennessee 37830	1
Dr. John Billheimer Systan, Inc. P.O. Box U Los Altos, CA 94022	1
Dr. William W. Chenault Human Sciences Research, Inc. Westgate Research Park 7710 Old Springhouse Road McLean, VA 22101	1
Dr. Jiri Nehnevajsa Professor of Sociology Department of Sociology University of Pittsburgh Pittsburgh, PA 15213	1

Addresses	Number of Copies
Dr. Conrad Chester ERDA, Holifield National Laboratory P.O. Box X Oak Ridge, TN 37830	1
Mr. Walmer E. Strope Stanford Research Institute 1611 North Kent Street - Rosslyn Plaza Arlington, VA 22209	1
Dr. Murray Rosenthal System Development Corporation 2500 Colorado Avenue Santa Monica, CA 90406	1
Mr. Don Johnston Research Triangle Institute P.O. Box 12194 Research Triangle Park, N.C. 27709	1
Mr. George Penebaker Department of Interior Defense Electric Power Administration - Room 6545 18th and C Streets, N. W. Washington, D.C. 20240	1
Mr. Robert A. Harker Center for Planning and Research, Inc. 750 Welch Road Palo Alto, CA 94304	1
Mr. Richard K. Laurino Center for Planning and Research, Inc. 750 Welch Road Palo Alto, CA 94304	1
The Dikewood Corporation 1009 Bradbury Drive, S. E. University Research Park Albuquerque, N.M. 87106	1
Ohio State University Disaster Research Center 127-129 West 10th Avenue Columbus, OH 43201	1
Stanford Research Institute ATTN: Mr. Robert M. Rodden 333 Ravenswood Avenue Menlo Park, CA 94025	1

Addresses	Number of Copies
URS Research Company 155 Bovet Road San Mateo, CA 94402	1
Dr. Gerald Klonglan Department of Sociology and Anthropology Iowa State University Ames, IA 50010	1
General Leslie Bray Director Federal Preparedness Agency, GSA 18th and F Streets, N. W. Washington, D.C. 20405	1
Mr. Thomas P. Dunne Administrator, Federal Disaster Assistance Administration Room B-133, Department of HUD 451 7th Street, S. W. Washington, D.C. 20410	1
Mr. Howard McClennon, President International Association of Fire Fighters 1750 New York Avenue, N. W. -- Third Floor Washington, D.C. 20006	1
General Manager International Association of Fire Chiefs 1329 18th Street, N.W. Washington, D. C. 20036	1
Mr. Bjorn Pedersen International Association of Chiefs of Police 11 Firstfield Road Gaithersburg, MD 20760	1
Mr. Ferris Lucas National Sheriff's Association Suite 320 - 1250 Connecticut Avenue, N. W. Washington, D.C. 20036	1
Mr. Gerald W. Collins, Executive Vice President National Defense Transportation Assoc. 1612 K Street, N. W. - Suite 706 Washington, D.C. 20006	1
National Fire Protection Association Library 470 Atlantic Avenue Boston, MA 02210	1

Addresses	Number of Copies
National Bureau of Standards Disaster Research Coordinator ATTN: Mr. C. G. Culver Office of Federal Building Technology Center for Building Technology Washington, D.C. 20234	1
Command and Control Technical Center The Pentagon - BE 685 Washington, D.C. 20301	1
Mr. Louis V. Spencer Radiation Theory Section National Bureau of Standards Room C-313 -- Building 245 Washington, D.C. 20235	1
National Academy of Sciences (JH-312) Commission on Sociotechnical Systems Committee on Fire Research 2101 Constitution Avenue, N. W. Washington, D.C. 20418	1
Gov. Leo A. Hoegh Timpa Road Chipita Park, CO 80811	1
The Council of State Governments ATTN: Mr. Hubert A. Gallagher Disaster Assistance Project 1225 Connecticut Avenue, N. W. -- Suite 300 Washington, D.C. 20036	1
Dr. Joseph E. Minor Texas Tech University Dept. of Civil Engineering P.O. Box 4089 Lubbock, TX 79409	1

RESEARCH TRIANGLE INSTITUTE, Research Triangle Park, North Carolina
Final Report 44U-1000 - DCPA Work Unit 2431G
DCPA Contract No. DCPA 01-74-C-0285
Use of Algorithms for Developing a Handbook to Aid Individuals in Coping with Medical Problems in a Nuclear Attack Emergency
Robertson, Elizabeth, Gabriel D. Ofiesh, and Donald R. Johnston
December 1977, 50 pp. (UNCLASSIFIED)

This report describes progress made in the development of guidance for crisis relocation planners in preparing a handbook to aid individuals in coping with the health, medical, and safety aspects of a nuclear attack emergency. The desired handbook should provide directions for the untrained person dealing with medical problems when no trained medical help is available and should do so without prior formal instruction. A prototype handbook meeting those requirements was developed. The prototype handbook employs algorithms to present information on the treatment of 51 conditions. Treatment information was derived primarily from the Medical Self-Help course manual. In addition, the prototype handbook contains instructions on bandaging, dosages of over-the-counter medications, and an algorithm for life-threatening conditions. The prototype handbook was field tested on a group of 60 subjects. The principal conclusion of this research is that algorithms are highly effective in this application. Specific recommendations for increasing handbook effectiveness are made.

RESEARCH TRIANGLE INSTITUTE, Research Triangle Park, North Carolina
Final Report 44U-1000 - DCPA Work Unit 2431G
DCPA Contract No. DCPA 01-74-C-0285
Use of Algorithms for Developing a Handbook to Aid Individuals in Coping with Medical Problems in a Nuclear Attack Emergency
Robertson, Elizabeth, Gabriel D. Ofiesh, and Donald R. Johnston
December 1977, 50 pp. (UNCLASSIFIED)

This report describes progress made in the development of guidance for crisis relocation planners in preparing a handbook to aid individuals in coping with the health, medical, and safety aspects of a nuclear attack emergency. The desired handbook should provide directions for the untrained person dealing with medical problems when no trained medical help is available and should do so without prior formal instruction. A prototype handbook meeting those requirements was developed. The prototype handbook employs algorithms to present information on the treatment of 51 conditions. Treatment information was derived primarily from the Medical Self-Help course manual. In addition, the prototype handbook contains instructions on bandaging, dosages of over-the-counter medications, and an algorithm for life-threatening conditions. The prototype handbook was field tested on a group of 60 subjects. The principal conclusion of this research is that algorithms are highly effective in this application. Specific recommendations for increasing handbook effectiveness are made.

RESEARCH TRIANGLE INSTITUTE, Research Triangle Park, North Carolina
Final Report 44U-1000 - DCPA Work Unit 2431G
DCPA Contract No. DCPA 01-74-C-0285
Use of Algorithms for Developing a Handbook to Aid Individuals in Coping with Medical Problems in a Nuclear Attack Emergency
Robertson, Elizabeth, Gabriel D. Ofiesh, and Donald R. Johnston
December 1977, 50 pp. (UNCLASSIFIED)

This report describes progress made in the development of guidance for crisis relocation planners in preparing a handbook to aid individuals in coping with the health, medical, and safety aspects of a nuclear attack emergency. The desired handbook should provide directions for the untrained person dealing with medical problems when no trained medical help is available and should do so without prior formal instruction. A prototype handbook meeting those requirements was developed. The prototype handbook employs algorithms to present information on the treatment of 51 conditions. Treatment information was derived primarily from the Medical Self-Help course manual. In addition, the prototype handbook contains instructions on bandaging, dosages of over-the-counter medications, and an algorithm for life-threatening conditions. The prototype handbook was field tested on a group of 60 subjects. The principal conclusion of this research is that algorithms are highly effective in this application. Specific recommendations for increasing handbook effectiveness are made.

RESEARCH TRIANGLE INSTITUTE, Research Triangle Park, North Carolina
Final Report 44U-1000 - DCPA Work Unit 2431G
DCPA Contract No. DCPA 01-74-C-0285
Use of Algorithms for Developing a Handbook to Aid Individuals in Coping with Medical Problems in a Nuclear Attack Emergency
Robertson, Elizabeth, Gabriel D. Ofiesh, and Donald R. Johnston
December 1977, 50 pp. (UNCLASSIFIED)

This report describes progress made in the development of guidance for crisis relocation planners in preparing a handbook to aid individuals in coping with the health, medical, and safety aspects of a nuclear attack emergency. The desired handbook should provide directions for the untrained person dealing with medical problems when no trained medical help is available and should do so without prior formal instruction. A prototype handbook meeting those requirements was developed. The prototype handbook employs algorithms to present information on the treatment of 51 conditions. Treatment information was derived primarily from the Medical Self-Help course manual. In addition, the prototype handbook contains instructions on bandaging, dosages of over-the-counter medications, and an algorithm for life-threatening conditions. The prototype handbook was field tested on a group of 60 subjects. The principal conclusion of this research is that algorithms are highly effective in this application. Specific recommendations for increasing handbook effectiveness are made.